

A Selection Guide to

**ELECTRONIC
MATERIALS**

from

Dow Corning

PRODUCTS - PROPERTIES - APPLICATIONS

Selection

COOLANTS

Dow Corning® fluids types:

| PROPERTIES | | UNITS | Test Method ASTM No. | 200 | 331 |
|-----------------------|---|--------------------------------|----------------------|-------------------------|-------------------------|
| PHYSICAL AND CHEMICAL | Physical Nature (as cured) | | | Fluid | Fluid |
| | Color | | | Clear | Clear |
| | Viscosity 25 C | centipoises | D 445 | 20 + * | 10.5* |
| | Specific Gravity 25 C | | D 792 | 0.955 | 0.940 |
| | Shelf Life | months | | 12 | 12 |
| | Pot Life 25 C (1) | hours | | dna | dna |
| | Cure Time/Temp. | hrs/°C | | dna | dna |
| | Refractive Index 25 C | | D 1218 | 1.40 | 1.3997 |
| | Radiation Resistance (2) | megarads | | 190 | 300 |
| | Flash Point (open cup) | °F | D 92 | 450 | 420** |
| | H ₂ O Absorption — 7 days | % at 25 C | D 570 | dna | dna |
| | Viscosity/Temp. Coefficient | | | 0.59 | 0.57 |
| | Temp. Range — useful | °C | | —60 to 232 | —90 to 200 |
| | Thermal Conductivity | cal/cm ² /°C/sec/cm | | 3.4 x 10 ⁻⁴ | 3.3 x 10 ⁻⁴ |
| | Thermal Shock MIL-I-16923C | 10 cycles | | dna | dna |
| | Weight Loss 96 hr/200 C | % | | dna | dna |
| | 1000 hr/200 C | % | | dna | dna |
| | Self Extinguishing | | D 635 | dna | dna |
| | Volume Expansion | cc/cc/°C | | 10.7 x 10 ⁻⁴ | 10.8 x 10 ⁻⁴ |
| | Specific Heat 25 C | cal/gm/°C | | 0.412 | 0.425 |
| MECHANICAL | Tensile Strength | psi | D 412 | dna | dna |
| | Elongation | % | D 412 | dna | dna |
| | Hardness Shore A | | D 676 | dna | dna |
| | Pour/Brittle Point | °C | D 97/D 746 | —60 | —90 |
| | Deep Section Cure | | | dna | dna |
| | Bleed (MIL-I-8660) | % | | dna | dna |
| | Consistency, unworked | | D 217 | dna | dna |
| | Evaporation (MIL-I-8660) | % | | dna | dna |
| ELECTRICAL | Arc Resistance | seconds | D 495 | dna | dna |
| | Dielectric Constant (10 ² cps) | | D 924/D 150 | 2.68 | 2.7 |
| | Dielectric Constant (10 ⁶ cps) | | D 924/D 150 | 2.68 | 2.7 |
| | Dissipation Factor (10 ² cps) | | D 924/D 150 | 0.00004 | 0.00015 |
| | Dissipation Factor (10 ⁶ cps) | | D 924/D 150 | 0.00001 | 0.00002 |
| | Electric Strength | volts/mil | D 877/D 149 | 350 | 350 |
| | Volume Resistivity | ohm-cm | D 1169/D 257 | 1.0 x 10 ¹⁴ | 1.0 x 10 ¹⁴ |
| | MIL SPEC. | | | MIL-S-21568A | MIL-S-27875 |

NOTES * Also available in viscosities of 10, 50, 100, 200, 350, 500 and 1,000 centistokes

++ Also available in viscosities of 1,000 and 10,000 centistokes

dna Does not apply

* Viscosities of these fluids in centistokes

** Closed cup

Guide To Electronic M

POTTING AND ENCAPSULATING MATERIALS

COATINGS

| Silastic® brand RTV rubber types: | | | | Sylgard® brand resin types: | | | |
|-----------------------------------|-----------------------|-----------------------|----------------------|-----------------------------|----------------------|----------------------|----------------------|
| 732 | 881 | 882 | 860 | 182 | 183 | 184 | 185 |
| Rubber | Rubber | Rubber | Rubber | Rubber-like | Rubber-like | Rubber-like | Rubber-like |
| White | Tan | White | Red | Clear | Black | Clear | Black |
| 700,000 | 50,000 | 50,000 | 30,000 | 5,250 | 8,000 | 5,250 | 8,000 |
| 1.07 | 1.13 | 1.13 | 1.47 | 1.05 | 1.23 | 1.05 | 1.23 |
| 6 | 12 | 12 | 6 | 12 | 12 | 12 | 12 |
| 1 | 3 | 1/6 | 4 | 8 | 4 | 2.5 | 2.5 |
| 24/25 | 24/25 | 24/25 | 24/25 | 4/65 | 4/65 | 24/25 | 24/25 |
| dna | dna | dna | dna | 1.43 | dna | 1.43 | dna |
| 100 | 100 | 100 | 100 | 200 | 250 | 200 | 250 |
| dna | dna | dna | dna | dna | dna | dna | dna |
| 0.40 | 0.40 | 0.40 | 0.20 | 0.10 | 0.12 | 0.10 | 0.12 |
| dna | dna | dna | dna | dna | dna | dna | dna |
| -73 to 260 | -55 to 250 | -55 to 250 | -54 to 315 | -65 to 200 | -65 to 250 | -65 to 200 | -65 to 250 |
| 4.95×10^{-4} | 5.25×10^{-4} | 5.25×10^{-4} | 7.5×10^{-4} | 3.5×10^{-4} | 7.5×10^{-4} | 3.5×10^{-4} | 7.5×10^{-4} |
| pass | pass | pass | pass | pass | pass | pass | pass |
| 6.4 | 6.3 | 6.3 | 5.7 | 2.1 | 1.5 | 2.1 | 1.5 |
| | | | | 3.2 | 2.3 | 4.0 | 2.8 |
| NO | NO | NO | NO | YES | YES | YES | YES |
| 9.3×10^{-4} | 7.5×10^{-4} | 7.5×10^{-4} | 5.2×10^{-4} | 9.6×10^{-4} | 7.8×10^{-4} | 9.6×10^{-4} | 7.8×10^{-4} |
| 0.35 | 0.34 | 0.34 | 0.32 | 0.34 | 0.32 | 0.34 | 0.32 |

| | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 200 | 300 | 400 | 650 | 900 | 900 | 900 | 900 |
| 250 | 160 | 160 | 110 | 100 | 100 | 100 | 100 |
| 25 | 35 | 43 | 65 | 40 | 45 | 40 | 45 |
| -73 | -73 | -73 | -73 | -70 | -65 | -70 | -65 |
| NO | NO | NO | YES | YES | YES | YES | YES |
| dna | dna | dna | dna | dna | dna | dna | dna |
| dna | dna | dna | dna | dna | dna | dna | dna |
| dna | dna | dna | dna | dna | dna | dna | dna |

| | | | | | | | |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 50 | 50 | 50 | 125 | 115 | 130 | 115 | 130 |
| 3.0 | 3.0 | 3.0 | 3.8 | 2.75 | 3.05 | 2.75 | 3.05 |
| 2.9 | 2.62 | 2.62 | 3.7 | 2.60 | 2.75 | 2.60 | 2.75 |
| 0.015 | 0.015 | 0.015 | 0.047 | 0.001 | 0.007 | 0.001 | 0.007 |
| 0.005 | 0.005 | 0.005 | 0.047 | 0.001 | 0.01 | 0.001 | 0.01 |
| 500 | 550 | 550 | 500 | 550 | 550 | 550 | 550 |
| 1.0×10^{13} | 1.0×10^{14} | 1.0×10^{14} | 3.0×10^{13} | 2.0×10^{15} | 1.0×10^{14} | 2.0×10^{15} | 1.0×10^{14} |

Dow Corning® and Sylgard® insulating varnishes and c

| Dow Corning | | |
|-----------------------|----------------------|----------------------|
| 991 | 997 | 630 |
| Film | Film | Film |
| Lt. Straw | Brown | Clear |
| 150 | 150 | 500 |
| 1.03 | 1.01 | 0.916 |
| 12 | 12 | 12 |
| dna | dna | dna |
| 4/135 | 6/150 | 2/25 |
| dna | dna | 1.4172 |
| 1000 | 1000 | 250 |
| 86 | 90 | 86 |
| 0.10 | 0.40 | 0.10 |
| dna | dna | dna |
| -34 to 260 | -34 to 315 | -60 to |
| 3.5×10^{-4} | 3.5×10^{-4} | 3.6×10^{-4} |
| dna | dna | dna |
| 4.2 | 6.4 | 5.7 |
| 6.3 | 9.7 | 10.5 |
| NO | NO | NO |
| 6.46×10^{-4} | 7.0×10^{-4} | 8.0×10^{-4} |
| 0.34 | 0.34 | 0.33 |

| | | |
|-----|-----|-----|
| | | |
| | | |
| dna | dna | dna |
| -40 | -20 | -60 |
| dna | dna | dna |
| dna | dna | dna |
| dna | dna | dna |
| dna | dna | dna |

| | | |
|----------------------|----------------------|----------------------|
| 200 | 200 | 180 |
| 2.8 | 3.1 | 2.8 |
| 2.70 | 3.0 | 2.7 |
| 0.002 | 0.01 | 0.002 |
| 0.001 | 0.007 | 0.001 |
| 2000 | 2000 | 1400 |
| 1.0×10^{14} | 2.0×10^{14} | 6.0×10^{14} |
| | MIL-I-2707B | |

(1) Pot life is defined as time required to double viscosity

(2) Useful after exposure to this megarad dose

All values are typical of production materials and are not intended for use in preparing specifications.

aterials

COMPOUNDS

ard® brand
coatings types:

Dow Corning® compounds and lubricants
types:

| Sylgard 1377 | 3 | 4 Compounds | 340 | med. 33 Grease | FS-1265 Fluid |
|--|------------------------|------------------------|-------------------------|------------------------|------------------------|
| Film | Grease | Grease | Grease | Grease | Fluid |
| Lt. Straw | Trans. | Trans. | White | Gray | Clear |
| 100 | dna | dna | dna | dna | 300 ⁺⁺⁺ |
| 1.12 | 1.0 | 1.0 | 2.45 | .972 | 1.25 |
| 12 | 12 | 12 | 12 | 12 | 12 |
| dna | dna | dna | dna | dna | dna |
| 6/150 | dna | dna | dna | dna | dna |
| dna | 1.406 | 1.406 | dna | dna | 1.381 |
| 1000 | 15 | 20 | 65 | 300 | 12 |
| 105 | dna | dna | dna | dna | 500 |
| 0.15 | 0.30 | 0.30 | 0.20 | 0.20 | dna |
| dna | dna | dna | dna | dna | 0.84 |
| 135 -34 to 260 | -40 to 200 | -57 to 200 | -65 to 200 | -73 to 175 | -48 to 260 |
| 0 ⁻⁴ 3.5 x 10 ⁻⁴ | 5.0 x 10 ⁻⁴ | 5.0 x 10 ⁻⁴ | 10.0 x 10 ⁻⁴ | 2.8 x 10 ⁻⁴ | 6.5 x 10 ⁻⁴ |
| dna | dna | dna | dna | dna | dna |
| 12.0 | 1.0 | 1.0 | 1.0 | 1.0 | 14.0 |
| 23.0 | | | | | |
| NO | YES | YES | YES | YES | dna |
| 0 ⁻⁴ 5.9 x 10 ⁻⁴ | 9.5 x 10 ⁻⁴ | 9.5 x 10 ⁻⁴ | 7.5 x 10 ⁻⁴ | 8.0 x 10 ⁻⁴ | 9.5 x 10 ⁻⁴ |
| 0.34 | 0.34 | 0.34 | 0.25 | 0.31 | 0.40 |

| | | | | |
|-----|-----|-----|-----|-----|
| dna | dna | dna | dna | dna |
| dna | dna | dna | dna | dna |
| dna | dna | dna | dna | dna |
| -40 | -75 | -80 | -75 | -73 |
| dna | dna | dna | dna | dna |
| dna | 3.0 | 4.0 | 0.4 | 2.0 |
| dna | 200 | 200 | 290 | 260 |
| dna | 1.5 | 1.5 | 0.5 | 1.5 |

| | | | | | |
|--|------------------------|------------------------|------------------------|----------|------------------------|
| 120 | 140 | 166 | 120 | dna | dna |
| 3.4 | 2.85 | 2.85 | 4.9 | dna | 6.95 |
| 3.3 | 2.85 | 2.85 | 4.9 | dna | 6.95 |
| 0.005 | 0.0006 | 0.0006 | 0.005 | dna | 0.06 |
| 0.002 | 0.0006 | 0.0006 | 0.001 | dna | 0.003 |
| 2000 | 500 | 500 | 450 | dna | 250 |
| 0 ¹⁴ 1.0 x 10 ¹⁵ | 1.0 x 10 ¹⁴ | 1.0 x 10 ¹⁴ | 2.0 x 10 ¹⁵ | dna | 3.0 x 10 ¹⁰ |
| | | MIL-I-8660A | | OS-10509 | |

PROPERTIES

Physical Nature

Color

Viscosity

Specific Gravity

Shelf Life

Pot Life

Cure Time/Temp.

Refractive Index

Radiation Resistance

Flash Point

H₂O Absorption

Viscosity/Temp. Coefficient

Temp. Range — useful

Thermal Conductivity

Thermal Shock

Weight Loss 96 hr/200 C
1000 hr/200 C

Self Extinguishing

Volume Expansion

Specific Heat

Tensile Strength

Elongation

Hardness Shore A

Pour/Brittle Point

Deep Section Cure

Bleed

Consistency

Evaporation

Arc Resistance

Dielectric Constant(10² cps)

Dielectric Constant(10⁶ cps)

Dissipation Factor(10² cps)

Dissipation Factor(10⁶ cps)

Electric Strength

Volume Resistivity

MIL SPEC.

ELECTRONIC PRODUCTS DIVISION

Dow Corning

HEMLOCK, MICHIGAN 48626

Dow Corning Electronic Materials

Dow Corning manufactures a complete line of dielectric materials for the electronic industry. Among these products is a wide range of silicone fluids, resins, varnishes, compounds, elastomers, molding compounds and laminating resins.

HEAT SHRINKABLE RUBBER

Parts and tubing of heat shrinkable silicone rubber are among the newest dielectric products available from Dow Corning. Used for cable coverings, connector boots and cable splicing, heat shrinkable rubber parts exhibit high heat resistance and good ablative properties.

MOLDING COMPOUNDS

Dow Corning manufactures transfer molding compounds for the fabrication of molded parts and the encapsulation of resistors, capacitors, diodes, transistors, modules and other electronic components. Silicone molding compounds exhibit excellent properties over a temperature range of -65 to 300 C. The low dielectric losses exhibited by these materials result in extended operating frequency ranges for high frequency devices.

SILICONE LAMINATES

Glass laminates bonded with Dow Corning silicone resins are available through leading custom fabricators and distributors. These silicone glass laminates are used for circuit boards, coil forms, protective tubing and mechanical parts requiring high heat resistance and good high frequency dielectric performance.

SILICONE FLUIDS

DOW CORNING® 200 Fluid, available in a wide range of viscosities from 0.65 to 2.5 million centistokes, is used as a dielectric in capacitors, transformers and high voltage devices and as a coolant in electronic equipment. It is designed to meet MIL-S-21568A.

DOW CORNING 331 Fluid is a dielectric coolant for airborne electronic systems and other electronic devices. It is designed to meet MIL-S-27875.

DOW CORNING FS-1265 Fluid is a fluorosilicone fluid with lubrication properties comparable to many organic lubricants . . . has been found especially useful for gyro floatation.

DOW CORNING Diffusion Pump Fluids types 702, 704 and 705 are specially formulated silicone fluids designed to produce ultrahigh vacuum. These fluids are stable, clear and exhibit low vapor pressures. Pressures of 5×10^{-11} torr, or lower, are attainable when refrigerated baffles are used in conjunction with Dow Corning 705 fluid. Applications for Dow Corning fluid types 702 and 704 include vacuum deposition of films in thin film electronic circuitry and production of thermionic and cold cathode vacuum tubes.

PROTECTIVE COATINGS

DOW CORNING 630 and 145 Protective Coatings are clear, wax-like coatings for printed circuit boards, coils and circuit modules.

**DOW CORNING ELECTRONIC MATERIALS AVAILABLE FROM
AUTHORIZED DISTRIBUTORS**

SILICONE FLUIDS

DOW CORNING® 200 Electronic Fluid is available from authorized distributors in viscosities of 10, 20, 50, 100, 200, 350, 500 and 1,000 centistokes. This fluid, designed to meet MIL-S-21568A, is tested in accordance with Dow Corning quality control specifications for electronic grade fluids.

SILASTIC® Brand RTV Rubber

SILASTIC 732 RTV Rubber is ready to use as squeezed from a tube or cartridge. This adhesive/sealant bonds metals, plastics or silicone rubber; seals connectors, repairs cables, fills voids and can be used to encapsulate small electronic components.

SILASTIC 881 RTV Rubber is used to encapsulate electronic circuitry and for mold making. After mixing with catalyst, it sets up in about three hours to form a tough, resilient solid.

SILASTIC 882 RTV Rubber offers the same properties as Silastic 881 RTV rubber and is specified where short set-up time . . . from a few minutes to one hour . . . is required.

SILASTIC 860 RTV Rubber cures in deep sections, withstands temperatures up to 600 F. It is ideal for potting, encapsulating and mold making . . . can be used with low melting point metallic alloys.

SOLVENTLESS SILICONE RESINS

SYLGARD® 182 Resin is a transparent silicone resin for potting, encapsulating and coating electronic circuits and components. Long pot life and low viscosity make this elevated temperature curing material ideal for use in production dispensing equipment.

SYLGARD 183 Resin, companion product to Sylgard 182 resin, is an opaque material with better heat conduction and a wider serviceable temperature range.

SYLGARD 184 Resin, a transparent room temperature curing resin, is designed for the potting and encapsulation of heat sensitive devices and circuits.

SYLGARD 185 Resin, opaque version of Sylgard 184 resin, is used where opacity is an asset and higher heat conductance is required.

SILICONE COMPOUNDS

DOW CORNING 3 Compound is a translucent, grease-like material, designed to reduce corrosion on switch contacts and battery terminals and as an insulator for electronic assemblies.

DOW CORNING 4 Compound, a greaselike sealing and lubricating material for switches, toroids and connectors and a moisture proofer for electronic equipment, is designed to meet MIL-I-8660A.

DOW CORNING 340 Compound is a highly heat conductive, greaselike material used on transistor and rectifier heat sink junctions to improve thermal conduction.

MOLD RELEASES

DOW CORNING 7 Compound, a mold release agent, with the consistency of petroleum jelly, provides easy release of epoxies, polyesters and vinyls.

DOW CORNING 20 Compound is a heat curing mold release agent designed to form a durable thin film for easy release of epoxies, polyurethane foams, silicone laminates and silicone encapsulating resins.

LUBRICANTS

DOW CORNING 33 Grease, in medium and light consistencies, is designed to lubricate ball bearings and instrument bearings over the wide temperature range of -100 F to 350 F. Designed to meet OS-10509.

COATINGS

DOW CORNING 991 Varnish is an air dry varnish for coating and impregnating coils, transformers and electronic circuitry.

DOW CORNING 997 Varnish meets class H insulation requirements. A high temperature material, it is used for impregnating and coating coils, transformers and other electrical/electronic equipment operating in high heat environments. Designed to meet MIL-I-2707B.

SYLGARD 1377 Varnish, a general purpose varnish with excellent adhesion and moisture resistance, is designed for coating and impregnating coils, transformers and reactors. Meets requirements of A, B, F, and H insulation systems.

Additional information on any or all of these materials is available from the Electronic Products Division, Dow Corning Corporation, Hemlock, Michigan, 48626.

ELECTRONIC PRODUCTS DIVISION

Dow Corning

HEMLOCK, MICHIGAN 48626

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